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ABSTRACT

This publication introduces children to water, air, and noise pollution, solid waste disposal, and pesticide use problems. Several pollution problems are explained and the importance of solving them is stressed. Some concepts such as recycling, closed systems, and environments that are related to pollution problems are also introduced. Each chapter includes introductory questions, a discussion of the problem, a checklist for action, and a situation to analyze. Appendices summarize U.S. Environmental Protection Agency laws, list EPA regional offices, and list some books and films about pollution. A glossary is also included. (MR)

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United States
Environmental Protection
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President's
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Washington DC
October 1977

EPA

Earth Trek...
Explore Your Environment

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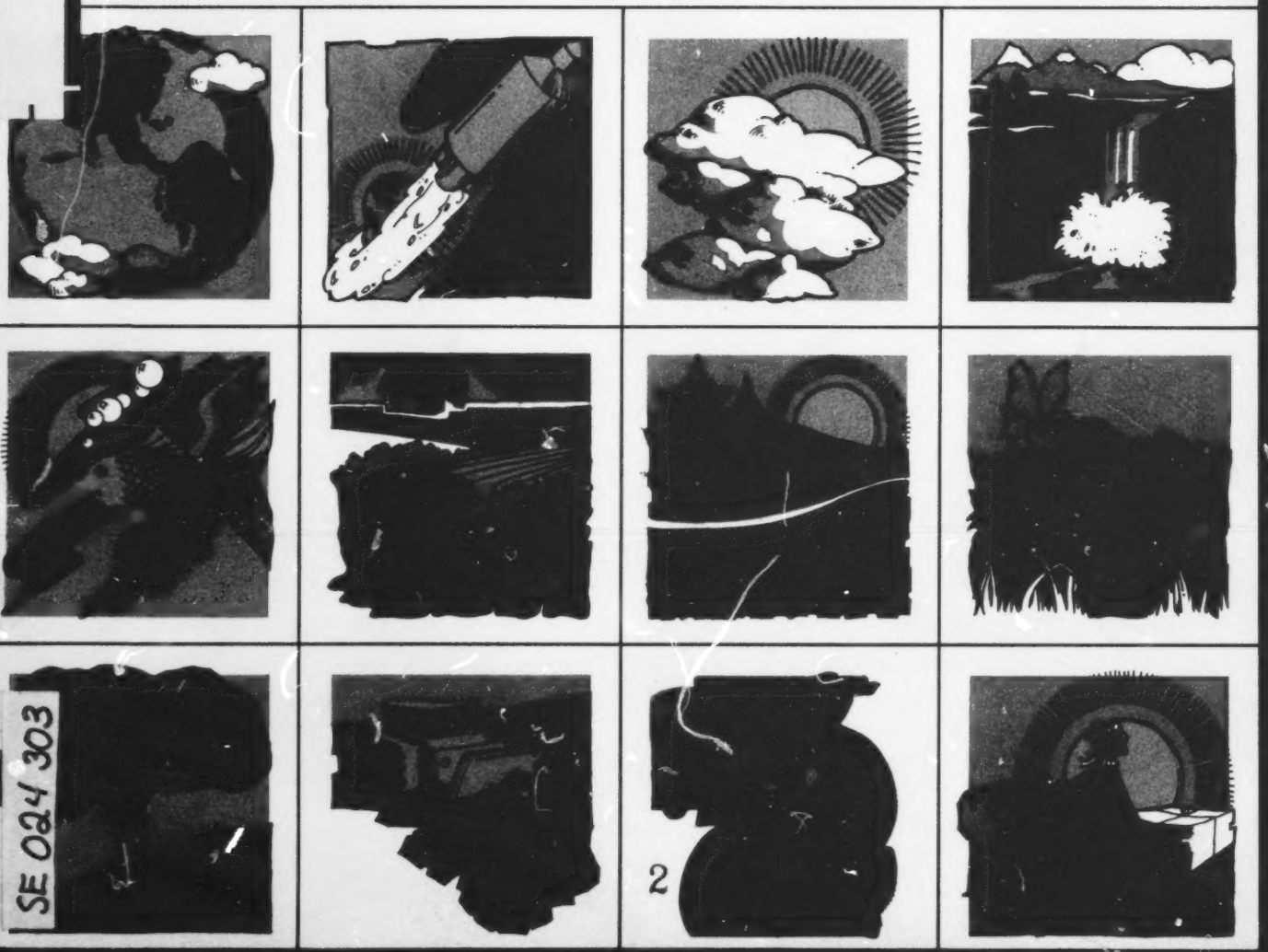

SE 024 303

Earth Trek...
Explore Your Environment

By Dr. Gerald Schneider

President
A Better World, Inc.

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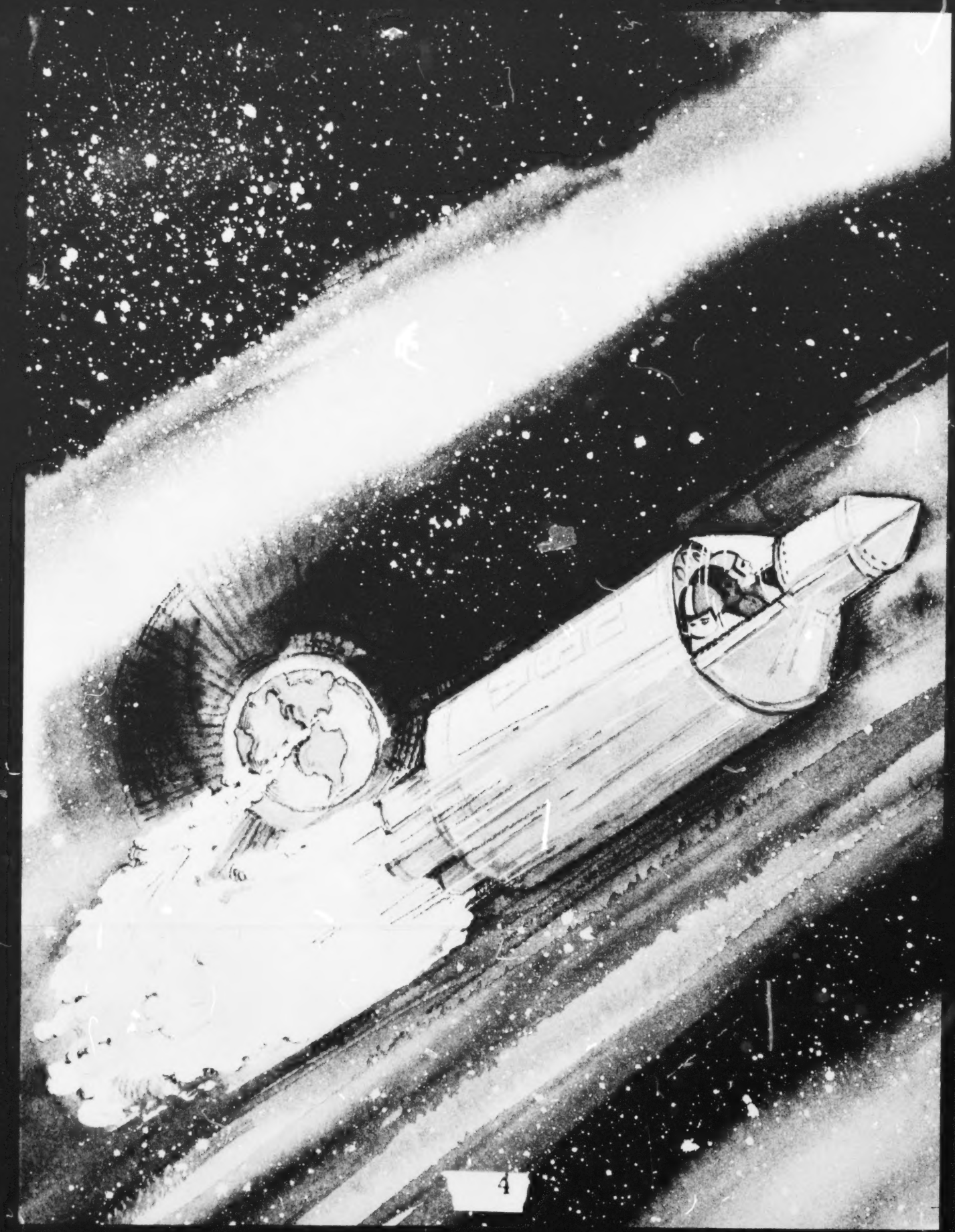
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Introduction

Your birth made an impact on the world. You were a new person for the world to feed, clothe, and shelter.

The kind of life you have today depends on the work of many people. Farmers who grow your food, factory workers who make your clothes, and people who build the place you live in are just a few of those who affect the quality of life you have.

As you grow, your needs grow, too—more food, more clothes, more toys, more of most everything. A desk and books are there when you start school. Gas, oil, or electricity (energy) are used to warm or cool you, cook your food, or run the TV or record player. You need more water for drinking and bathing.

Industries make televisions, stereos, sports equipment, and other things for you to enjoy. They mine the land and oceans for more materials to make these things. Materials, energy, water, and other things add to the quality of your life.

A lot of people and things are needed to give you the kind of life you have. These people and things are called resources. And these resources will be needed every day for as long as you live.

Today, you are still making an impact on the world. Every person—in fact, every living thing—affects the world and its surroundings.

What we do to maintain our way of life affects the world's environment and, in turn, affects us. Environment means the surroundings living things find themselves in. For example, a monkey's environment is a jungle while yours may be a city.

Our present methods of meeting our needs create environmental problems and cause pollution. Pollution is whatever makes our air, land, and water dirty and unhealthy.

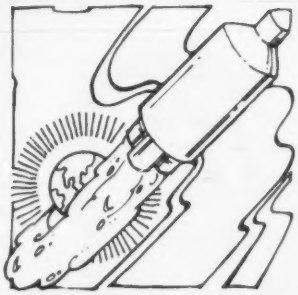
Burning fuel to make electricity for houses and factories can pollute (make dirty and unhealthy) the air we breathe by filling it with smoke, dirt, and chemicals. Mining for the fuel and materials to make the things we buy can pollute water. For example, rain can wash soil and acids around mining sites into nearby rivers and lakes.

Wastes from manufacturing and disposal of garbage can pollute land, water, and air. Noise from big machines used to make and move things is also a kind of poliution. (It can affect your hearing, for example). Chemicals sprayed on crops and those added to food, lotions, and cleaning agents may end up harming us.

Many of the things we do and want cause pollution. Whether we pollute the environment or not depends on how we produce the things we want.

The Earth Must Be Used Carefully, No New Earth Will Be Available

The way we live in the world is something like the way an astronaut lives in a spaceship. An astronaut in space needs 11 pounds of water and two pounds of air each day to live. But if that were all the water and air an astronaut had, how long could the astronaut make them last?



Answer: Forever, if need be!

The reason, of course, is that a spaceship's water and air can be cleaned and made usable again within the spaceship. Cleaning and renewing things already used is called *recycling.* Special machines recycle water and air on spaceships over and over again so the astronauts never run out!

Recycling of water and air also happens on Earth, but is done by nature, not machines. Earth's water, for example, is recycled when it is warmed by the sun, becomes a gas (water vapor) and then returns "cleansed" as rain or snow. Green plants, in making their food, use carbon dioxide that is breathed out by people and animals. In the process, plants produce large amounts of oxygen which we need. That is how plants renew the air we breathe (recycle it).

Closed System

Earth is sealed off from space much as a spaceship is. Earth's land, water, and air are locked together by gravity and cannot drift off separately into space. Except for tiny amounts of air and spacecraft (with all they carry aboard), no matter escapes from Earth out into space. And except for cosmic dust and space objects such as meteors, no new matter is added to Earth.

All the fresh water, air, mineral, plant, and animal resources Earth now has it has always had. Earth gets no new supplies from space.

The water you drink today may contain atoms drunk by dinosaurs millions of years ago. And your favorite person in history may have breathed some of the same air you are breathing now.

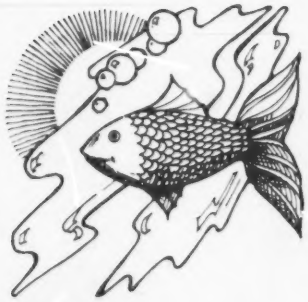
Spaceships and Earth, which are sealed off from space, are *"closed systems".* Recycling of resources such as water and air are vital in closed systems. Without recycling, water and air would soon be used up in a closed system.

Although new water and air (both materials) do not enter the Earth's closed system, energy in the form of sunlight does reach us. Sun energy provides the power for recycling by nature.

Wood, wool, cotton, and other materials produced by living things are broken down into atoms when eaten by insects, bacteria, and fungi. The atoms are recycled into new materials. For example, the atom may become mineral matter dissolved in water that plants soak up through their roots.

But some materials that are made in laboratories by people *cannot* be recycled by nature. These man-made materials include many plastics, detergents and chemicals. They cannot be eaten by insects, bacteria, fungi, or any other living thing. Thrown away in the trash, dumped into water or carelessly sprayed in the air, these man-made materials are *not* destroyed. Instead, they remain as they are—often poisoning the environment and becoming polluters.

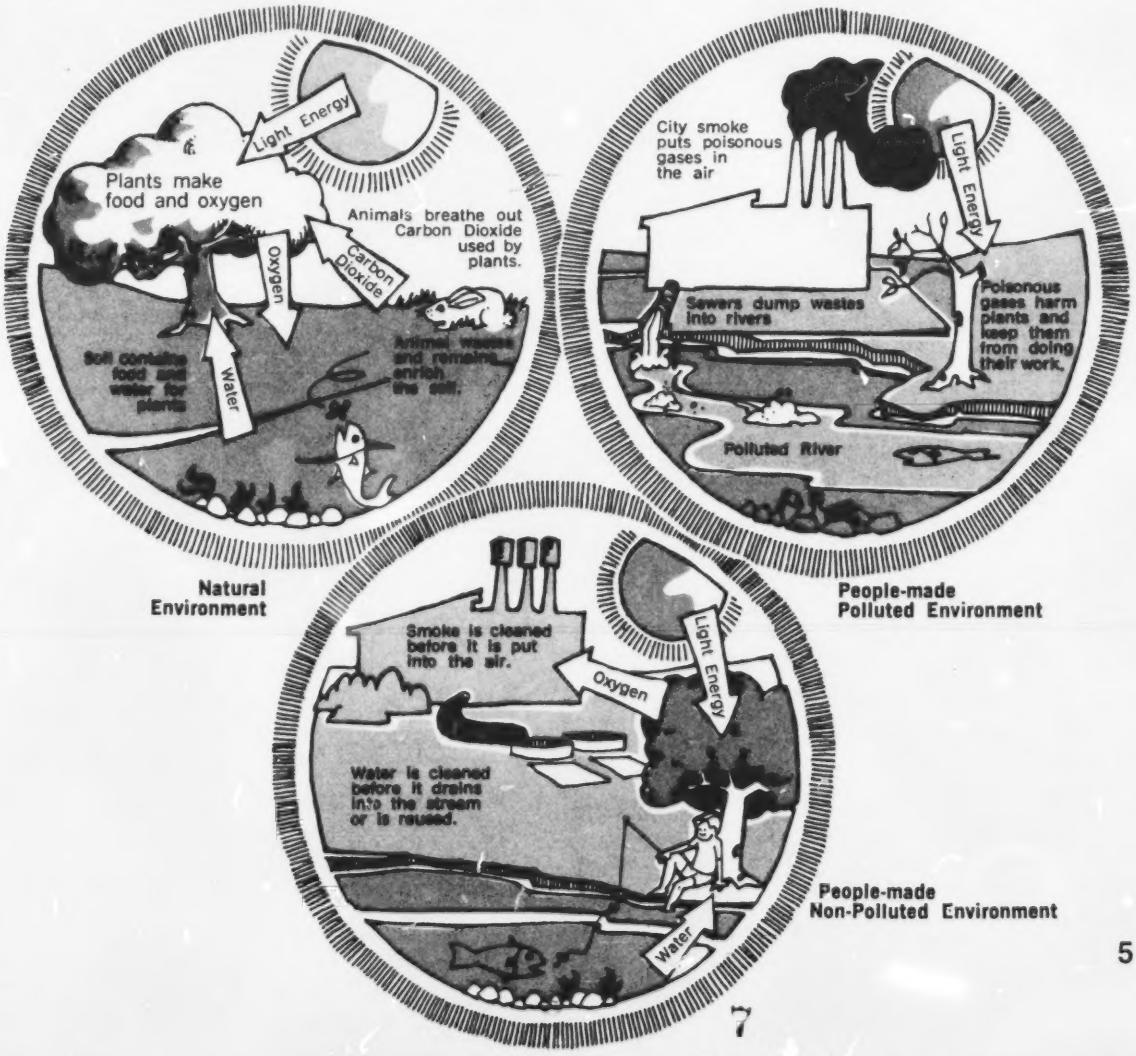
There are still other materials, such as iron, copper, and glass, that are recycled in nature, but very slowly. These materials must be *dissolved* in water before living things can absorb them. And it may take many years before they are dissolved. The cans and junk cars that litter our country-



sides are examples of the environmental problems caused by slowly dissolving materials. They also pollute.

People can help to protect the environment from man-made materials that cannot be destroyed and materials that are only slowly dissolved by nature. Nature cannot do the job alone. As you may have heard in a radio or TV announcement: "People make pollution, people can stop pollution".

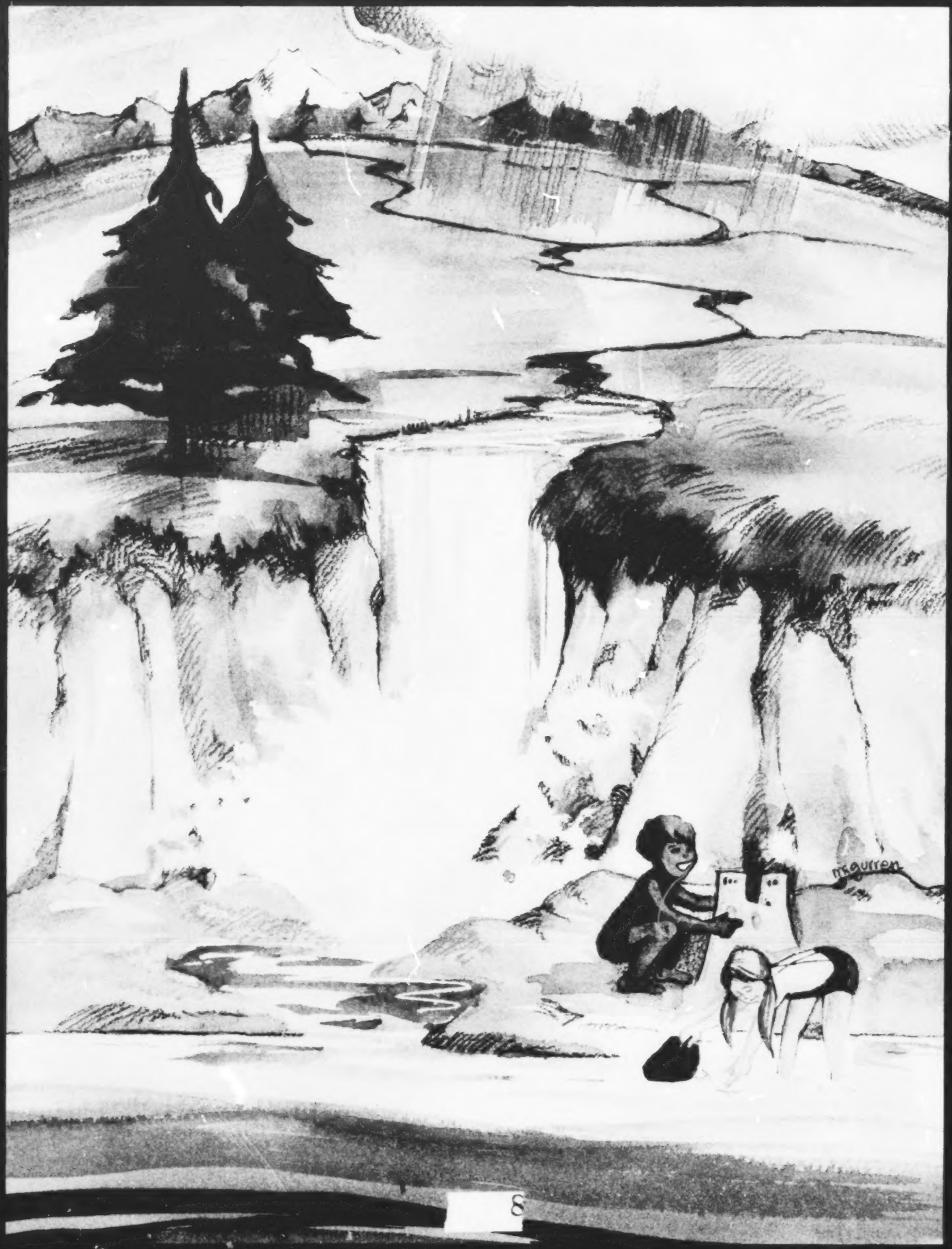
To help, you must learn as much as you can about pollution problems. Then you must act on what you learn. Action without learning rarely helps and it may even make matters worse. This booklet can help you learn and act.


Light Energy
Plants make food and oxygen
Animals breathe out Carbon Dioxide used by plants.
Oxygen
Carbon Dioxide
Water
Soil contains food and water for plants
Animal wastes and remains enrich the soil.
City smoke puts poisonous gases in the air
Light Energy
Sewers dump wastes into rivers
Poisonous gases harm plants and keep them from doing their work.
Polluted River
Smoke is cleaned before it is put into the air.
Oxygen
Light Energy
Water is cleaned before it drains into the stream or is reused.
Water

Natural Environment

People-made Polluted Environment

People-made Non-Polluted Environment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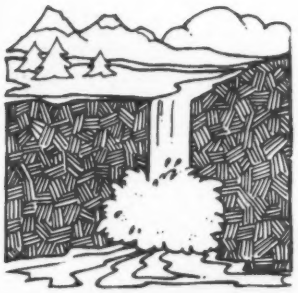


Needed: Clean Water

Try these questions (correct answers at end of chapter):

1. How much water do you and your family use each day?

2. What is the most common pollutant in water?

Life Depends On Water

You, other people, and all animals and plants are mostly water. A person is about 65 percent water. And each of us needs to drink at least five pints of water each day to live. Big animals like horses need about 15 gallons of water a day. Do you know how much water your favorite pet needs?

Water is also used for washing, air conditioning, household work, and sprinkling lawns. And steel, gasoline, paper, and most other products are made with the help of water. Power plants use water for cooling. Farms of course, need water to grow food.

Goods and people are carried around the world on ships that move on water. Water is used for swimming, boating, and other kinds of recreation. And water is the home of many animals and plants such as fish, whales, clams, and seaweeds.

Life would not be possible without water. That is why it is so important to keep water clean and usable.

What Is Water Pollution

Water is *polluted* when it is unsafe to use because sewage and other wastes have been dumped untreated into it! Polluted water can smell, have garbage floating in it, look muddy and be too ugly to swim or boat in. But even water that looks clean and smells good can be polluted: it may be loaded with germs and dangerous chemicals that you cannot see.

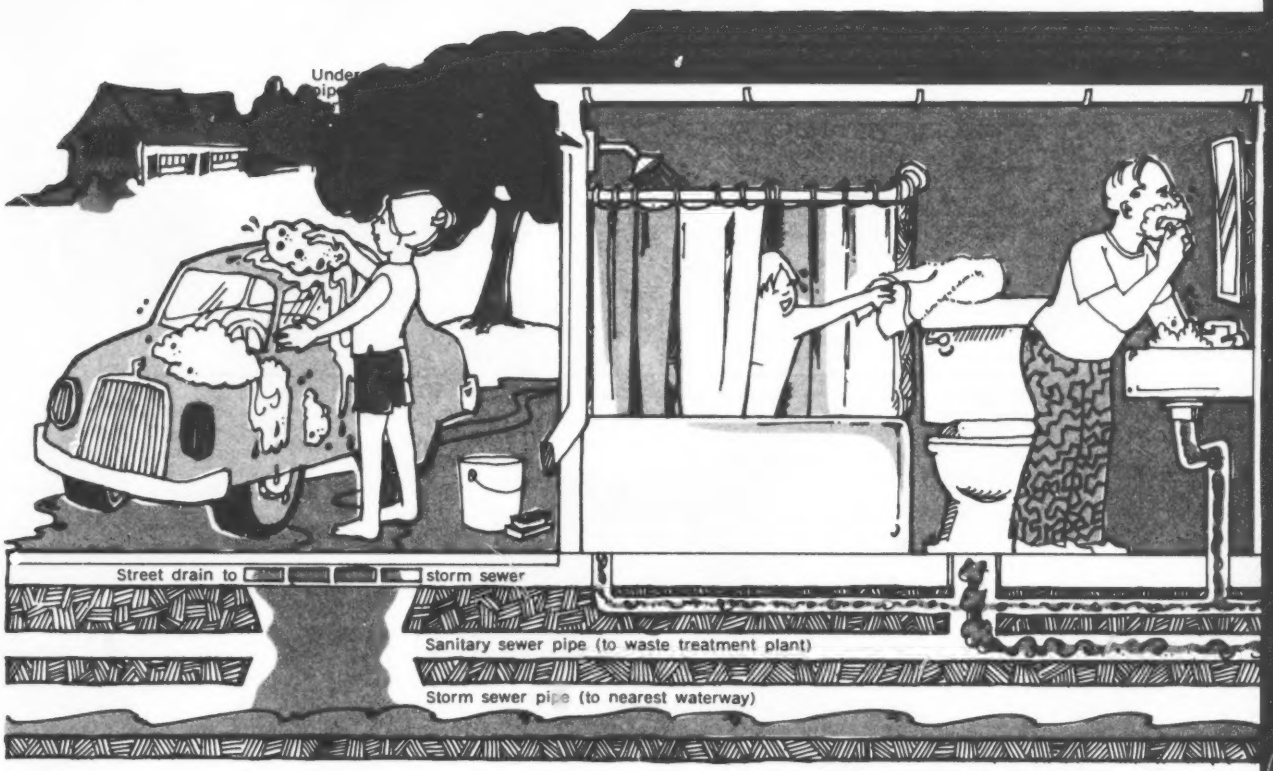
People pollute water in a lot of ways. One way is to allow factory and bathroom wastes to flow through pipes and into waterways with no treatment. Another way is to allow soil, fertilizers, and industrial wastes to wash from farms, building sites, and mining sites into waterways after a rain.

Bacteria can feed on some wastes. Other wastes will be diluted by water in waterways. But nature can only do so much! We are making more wastes than nature can handle alone. More and better wastewater treatment is needed.

Water Treatment

Not all communities properly treat water before drinking it! Most of us think that the water we drink is safe—and it usually is. But about 4,000 Americans are made sick each year by germs and bacteria in unsafe drinking water, according to medical reports. Many others are probably also sickened by bad water, but they do not know that it was the water that made them sick and it is never reported.

Water must also be cleaned after it is used and before it goes back into waterways. This cleaning is done by waste treatment or sewage plants.



The picture (right) shows two stages of wastewater treatment: *primary* and *secondary*. A third stage or *tertiary* treatment (not shown in the picture) is required to clean up pollutants the first two stages missed. Few communities use tertiary treatment.

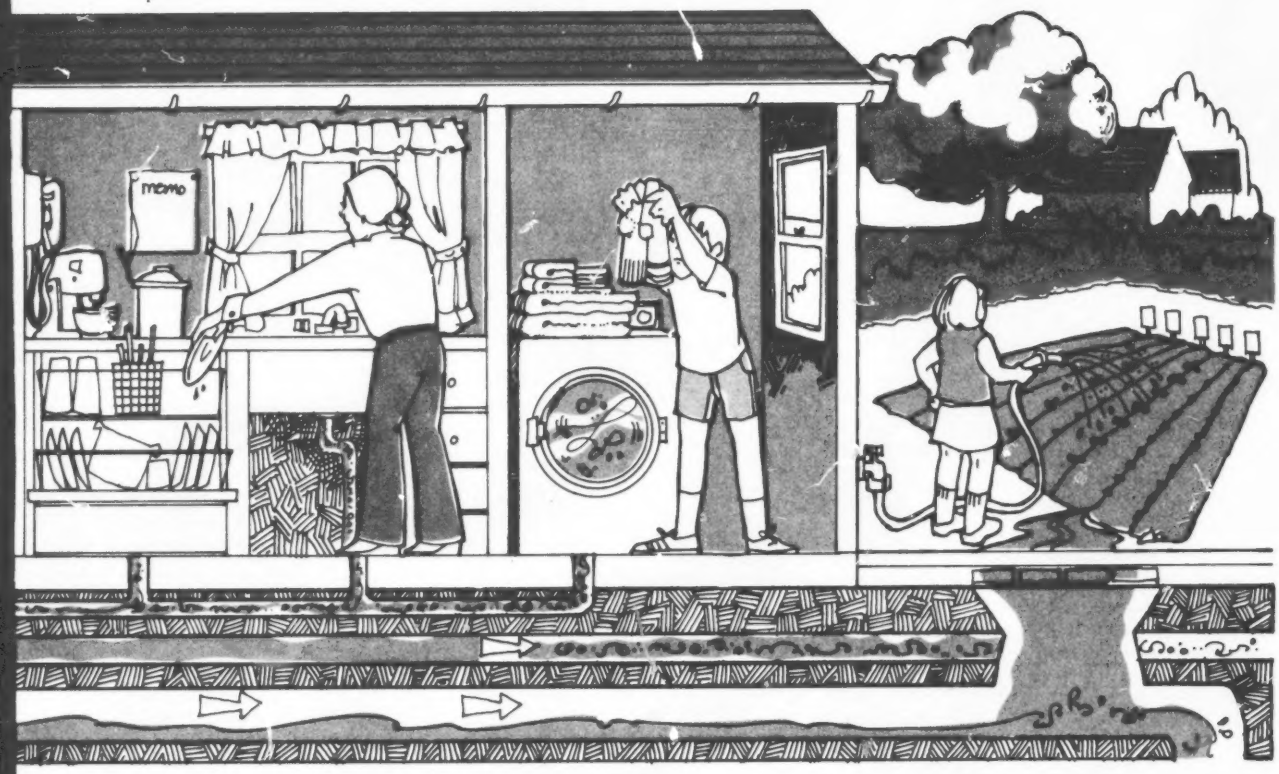
Rivers and lakes will dilute much of the pollution that remains after secondary treatment and bacteria will feed on other pollutants, as already mentioned. But only tertiary treatment can remove man-made chemicals.

Tertiary treatment is costly. It includes ways to speed settling out of solids in wastewater, use of electricity and carbon filters to remove wastes and other special methods. All communities may have to use tertiary treatment of water in the future because of the increase of man-made chemicals in water.

Find Out More About Water Supply And Pollution

Where does your community's water supply come from? Can you hike or ride to any of the water sources? Is the water you drink treated to remove dirt and germs before it is piped to your house? Is there a water treatment plant you can visit?

Learn more about how sewage is treated by doing some water treatment yourself. Ask your parents to buy you a cheap flour sifter or make a container with a screen bottom. Cover the screening with a layer of absorbent cotton, next a one-inch layer of coarse sand and then a one-inch layer of gravel.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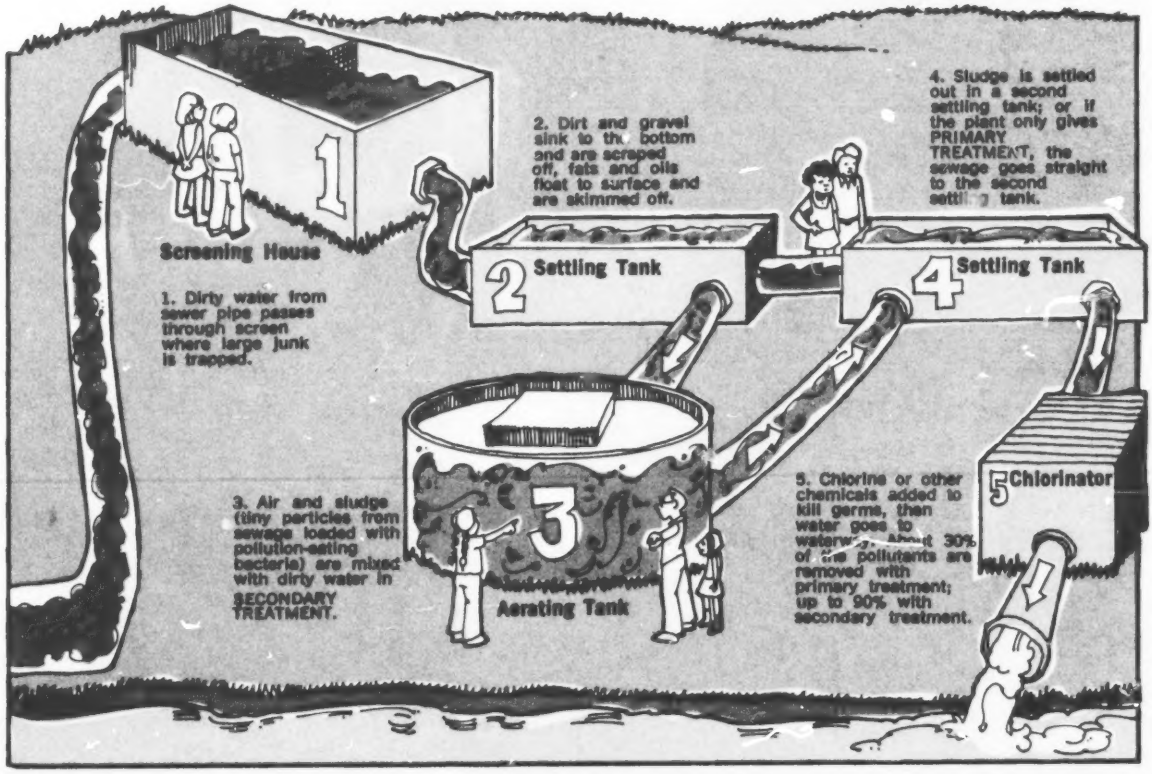

1
Screening House
1. Dirty water from sewer pipe passes through screen where large junk is trapped.
2. Dirt and gravel sink to the bottom and are scraped off, fats and oils float to surface and are skimmed off.
2 Settling Tank
4. Sludge is settled out in a second settling tank; or if the plant only gives PRIMARY TREATMENT, the sewage goes straight to the second settling tank.
4 Settling Tank
3
Aerating Tank
3. Air and sludge (tiny particles from sewage loaded with pollution-eating bacteria) are mixed with dirty water in SECONDARY TREATMENT.
5 Chlorinator
5. Chlorine or other chemicals added to kill germs, then water goes to waterways. About 30% of the pollutants are removed with primary treatment; up to 90% with secondary treatment.

Set the sifter over a jar and slowly pour muddy water into the sifter. Does the water look clean when it comes out the bottom into the jar? *WHILE THE WATER MAY LOOK CLEAN, IT STILL HAS GERMS AND SHOULD NOT BE DRUNK!* Compare what you did with the way wastewater is treated in regular sewage treatment plants as illustrated in this chapter.

Visit a construction site after a heavy rain. Has any soil been washed away from the site? Did any soil wash into a nearby lake or river? What can be done to insure that soil stays in place at construction sites when it rains?

Trace the runoff from a service station after a heavy rain. Are there signs of oil in water from the service station into street gutters (oil creates shiny, rainbow-colored streaks in water)? Where will any oil in the water go? What effect can oil have on the local water supply or the quality of water fish live in? What can service station owners do to prevent oil from washing away?

Is there a factory that is polluting water near you that you can visit? A teacher, the health department, or a local anti-pollution organization may help you find such a factory. What kind of pollution is involved? Is the pollution only the fault of the factory owner? What can your community do to help stop pollution from factories?

Checklist For Action

Here are ten ways to help reduce water pollution problems. Can you list others?

- Make an exhibit showing how water is supplied and wastewater treated in your community for display at school or in a library.
- Adopt part of a river or lake for you and some friends and classmates to take care of. Plan litter cleanup trips, test the water for pollutants, and tell others of the value of your adopted water area. (Have an adult on hand for safety.)
- Help to plan a special program on water pollution at your school. (Ask your local public works or health department for aid.)
- Find out what the drinking and water pollution laws are in your community and how well they are enforced.
- Interview water polluters in your area for a school newspaper and describe their water pollution control problems.
- Organize a debate in school to defend and oppose the statement: "Environmental legislation and enforcement are necessary to protect water quality".
- Spend a few hours each month working with a community anti-pollution organization on water pollution problems.
- Plan a trip to a water supply or wastewater treatment plant.
- Draw a map of your community showing where sources of water pollution are located.
- Use compost instead of store-bought fertilizers and pesticides on lawns (since excess amounts of these chemicals can drain off after a rain and wash into waterways).

What Would You Do?

You catch a fish in a small lake near your house. You are not sure that the fish is safe to eat (the water may have been polluted). Would you eat the fish?

You are hiking with a club in a wooded area. Another hiker sees a clean-looking stream, takes a drink from it and offers you a drink of it from a cup. Would you drink the water?

Answer to questions at beginning of chapter:

1. If yours is like the average American family, you use about 160 gallons each day.

2. *Sediments* (soil, sand, and minerals) washed from the land into water are the most common pollutants in water in general (often more than half of all pollutants in a river or lake).

Needed: Clean Air

Try these questions (correct answers at end of chapter):

1. How much does sickness and damage from air pollution cost Americans each year?

2. What is the biggest cause of air pollution in cities?

What Is Air Pollution

Can you see the sky clearly where you live? If not, the air may be polluted. Polluted air can smell bad or look smoky. But pollution could also be there without your smelling or seeing it.

Air pollution comes from soot, fly ash, and chemicals produced by automobile exhaust fumes, chimney smoke, burning garbage dumps, and materials sprayed in the air. Soot from burning fuel oil is the main pollutant that gives smoke its dark color. Fly ash is tiny ashes that go up and out of chimneys and make smoke even darker. Chemicals of many kinds that you cannot see mix with the smoke. *Smog*, the eye-stinging haze that hangs over most cities, is produced when chemicals in the air mix with sunlight.

Damage To Things From Air Pollution

Air pollutants such as soot and fly ash settle out on things and make them dirty. Blown by the wind, air pollutants act like sandpaper and scratch away buildings and statues. Chemical air pollutants discolor and "eat away" (corrode) materials. Can you find any change in the color of bricks on old buildings near where you live? Is there a statue in the park that is crumbling away? If you find these things, chances are that air pollution was one of the causes.

Plants are also harmed by air pollution. Their leaves may get dry. Brown spots may appear on them. Or the leaves may turn yellow and fall off. Orange and other citrus trees and "salad" crops (such as lettuce and celery used in salads) are especially hurt.

Even house plants suffer from air pollution from cooking fumes. Are any of the plants in your house being affected by air pollution? (Look for symptoms mentioned above.)

Animals are also affected by air pollution. Cattle can get sick . . . and so can pets. A small amount of some chemicals sprayed near an aquarium may kill pet fish, for example. Care must be taken so that you and your pets are safe from fumes of many paints, lotions, glue, cleaning agents, and other chemicals.

Sickness From Air Pollution

Even a little air pollution can make your eyes burn and your head ache. It can tire you out, blur your vision, make you dizzy, and make it hard for you to breathe. Air pollutants can also affect asthma and make catching colds and flu more likely. And air pollutants have been linked to some cases of serious diseases such as lung cancer and heart ailments.

What To Do In A Pollution Alert

When air pollution gets very bad, many cities have a "pollution alert". A pollution alert is a warning that the air outside is not healthy. Factories may have to close to reduce chimney smoke. People may be asked not to drive their cars so as to reduce auto exhaust fumes.

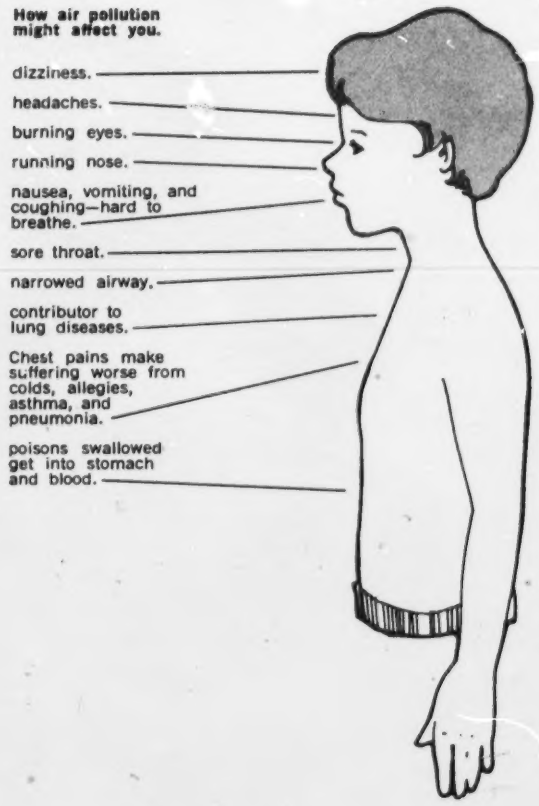
Pollution alerts usually end when fresh winds blow or rain washes the pollutants away.

Pollution alerts are especially dangerous to people who have breathing problems, hayfever, and other allergies. But you and everybody else should avoid bad air if you can.

If there is a pollution alert in your community, try to stay indoors more, move around less, and keep away from smoke. A parent or teacher may be able to tell you more about what you should do during a pollution alert.

Air Quality Today

Air quality in the United States is getting better but much more needs to be done. It will take the combined interest of everyone—you, other people, industry, and government—to help restore the quality of the air we breathe.


How air pollution might affect you.
dizziness.
headaches.
burning eyes.
running nose.
nausea, vomiting, and coughing—hard to breathe.
sore throat.
narrowed airway.
contributor to lung diseases.
Chest pains make suffering worse from colds, allegies, asthma, and pneumonia.
poisons swallowed get into stomach and blood.

Is The Air In Your Neighborhood Polluted?

Why not find out if the air is polluted in your neighborhood? Try a "touch survey" and see how much dirt comes off on your fingers. Touch the sidewalk, buildings, stones, fences, trees, parked cars, and store windows. Wipe dirt off your fingers after each touch. Which things were dirty? Which were the dirtiest? Can you tell where the dirt came from?

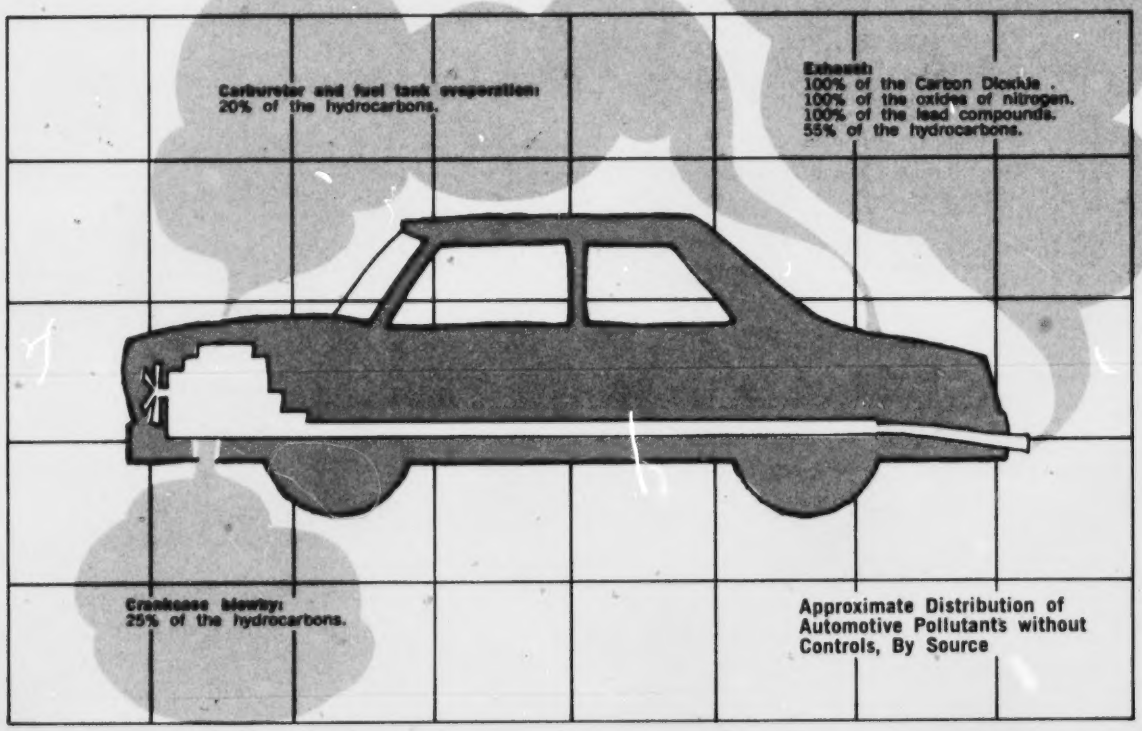
Do a "seeing survey." Can you see dirt on the window of your bedroom? Can you see dirt on clothes hung on a clothesline? How long does it take your bedroom windows to get dirty again after they are cleaned? How long can clean clothes hang on a clothesline before they get

dirty? Where is the dirt coming from (is it from air pollution alone)?

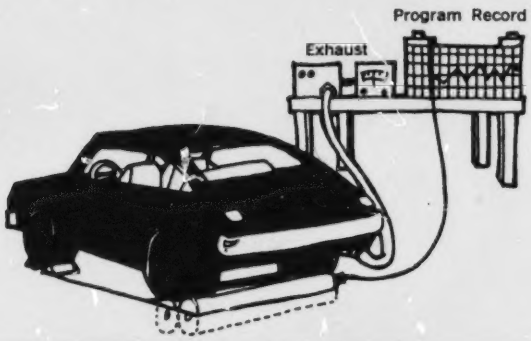
Smear two sheets of the same kind of writing paper on one side with petroleum jelly. Put the sheets next to each other, smear sides up, on a window sill. Clamp the sheets in place with the closed window. Do this when it is not raining or snowing.

Take one sheet in at the end of one day and see how dirty it looks (compare it to a clean sheet of the same kind of paper). Save the dirty sheet. Take the other sheet on the window sill in after a week. See how dirty it is (compare it to the first dirty sheet and a sheet of clean paper of the same kind). How dirty do you think the air is?

All these surveys and tests are more fun if you do them with friends and classmates. You can compare findings. Maybe you can even tack the sheets of paper up on a bulletin board at school with a note about what you did. Why not have a contest to see who can find the dirtiest air? Have an adult help.


Carburetor and fuel tank evaporation:
20% of the hydrocarbons.
Exhaust:
100% of the Carbon Dioxide .
100% of the oxides of nitrogen.
100% of the lead compounds.
55% of the hydrocarbons.
Crankcase blowby:
25% of the hydrocarbons.

Approximate Distribution of Automotive Pollutants without Controls, By Source



Checklist For Action

Here are ten ways to help reduce air pollution problems. Can you list others?

- Find out who the major air polluters are in your area (a local anti-pollution organization can help), what can be done about their pollution (pollution problems are often not their fault alone), and how you can help.
- Form an anti-pollution club in your school. Plan projects, study local and national air pollution problems, and invite experts to talk to your club.
- Invite polluters to talk to your club about their pollution control problems.
- Learn about the air pollution laws in your community and how well they are enforced (your local health department and other groups can help).
- Help plan a special program on air pollution at your school.
- Walk or bike whenever possible instead of riding in a car.
- Organize a car pool if you must travel by car to school.
- Take photographs of the effects air pollution has on buildings, statues, and plants in your community and use the photographs to make an exhibit.
- Make a slide show or a film that shows why clean air is everyone's responsibility.
- Use grooming aids, paints, glues, and detergents that come in non-spray containers.

_____

_____

_____

_____

What Would You Do?

Your friend only lives a few blocks from her school. But a parent drives her to and from school each day. You think she should walk between home and school since using a car when you do not have to wastes fuel and makes air pollution problems worse. Should you talk to your friend about it?

You felt wonderful after a trip to the country. The fresh air was great! Now you are back in town and the air smells bad. What would you do to help make the town's air fresher?

Answer to questions at beginning of chapter:

1. Sickness from air pollution costs Americans about $4.6 billion yearly in medical treatment, lost wages for sick workers, and lost work. Damage to buildings, clothing, and other things from air pollution costs about $12.3 billion yearly. The total yearly cost of air pollution in sickness and damage to things, then, is $16.9 billion.
2. *Automobiles* cause more air pollution in cities in general than anything else! As much as 85 percent of air pollution in some cities comes from moving cars, trucks, and buses.

Needed:
Good Ways to Get Rid of Trash and Garbage

Needed: Good Ways to Get Rid of Trash and Garbage

Try these questions (correct answers at end of chapter):

1. How much household trash and garbage does your family throw away each day?

2. How much *solid waste* (all trash and garbage) do Americans throw away each year?

Methods Of Waste Disposal Used Now

What do we do about the *solid waste* we produce so much of? (See answer to question 2 above for the amount produced.)

Throw the stuff away and it litters streets, roadways, the countryside, and waterways.

Burn it in the open and it causes air pollution.

Leave it in the open at garbage dumps and it smells, looks ugly, and attracts rats and insects.

Bury it and we lose the value of materials in it that might be reclaimed and reused.

Bury it without care and dangerous chemicals drain from it to poison land and water.

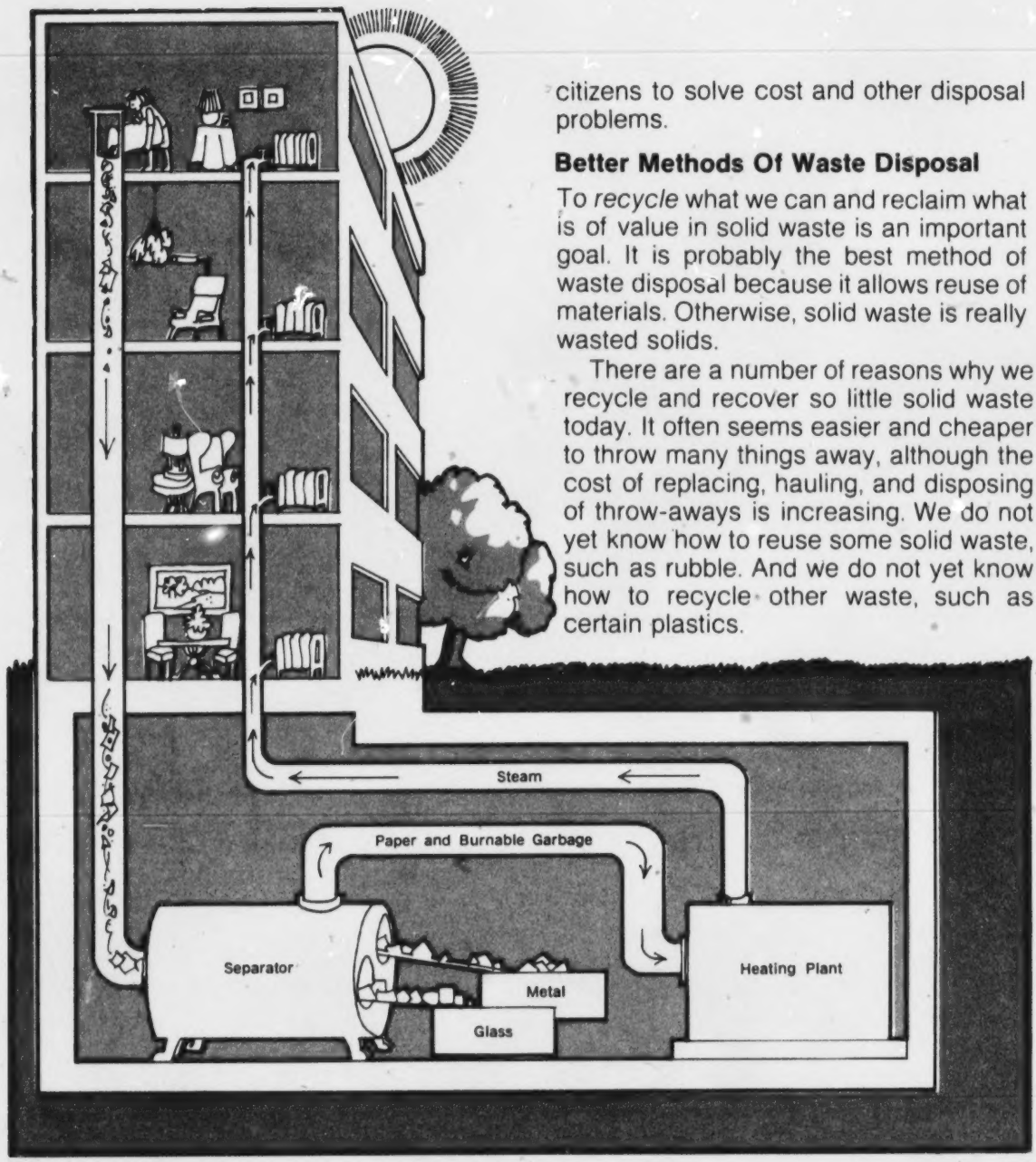
Each year, Americans "throw away" 7.6 million television sets, 7 million cars and trucks, 48 billion cans, 26 billion bottles and jars, and 30 million tons of paper! Waste disposal now costs $4.5 billion per year. Something has to be done with all this trash and garbage even if it is not the best thing that can be done.

Open garbage dumps (the most common place we put our solid waste) have been made better by turning them into *sanitary landfills.* In a sanitary landfill, a layer of soil applied daily over the waste keeps pests away, cuts off water pollutants that wash off from the site after rain, does away with the need to burn the waste, and prevents wind-blowing of litter. When filled, the site can be planted with grass, shrubs, and trees and made into a park.

However, ordinary sanitary landfills may not stop waste materials from seeping through the soil and ruining water supplies. For example, *hazardous waste*—chemical, radioactive, biological, flammable, and explosive types—need landfills that are sealed in special ways to prevent seepage. And Americans produce more than 10 million tons of hazardous waste each year!

In the past, hazardous waste was burned in *incinerators* (furnaces for garbage) or dumped into waterways. As air and water pollution controls went into effect, however, more of these wastes were put into landfills. With 5 to 10 percent yearly increases in the amount of hazardous waste produced, the health of people is threatened by seepage of hazardous waste from the landfills.

There are good ways to get rid of most hazardous waste without harming health or ecology. But costs of such disposal are high. Federal and State and local governments are working with business firms and



citizens to solve cost and other disposal problems.

Better Methods Of Waste Disposal

To *recycle* what we can and reclaim what is of value in solid waste is an important goal. It is probably the best method of waste disposal because it allows reuse of materials. Otherwise, solid waste is really wasted solids.

There are a number of reasons why we recycle and recover so little solid waste today. It often seems easier and cheaper to throw many things away, although the cost of replacing, hauling, and disposing of throw-aways is increasing. We do not yet know how to reuse some solid waste, such as rubble. And we do not yet know how to recycle other waste, such as certain plastics.

Some garbage that cannot be recycled or reclaimed now can be burned to produce energy. The city of St. Louis has a system that separates burnable from nonburnable waste. The burnable waste is mixed with coal and used as fuel in electric utility boilers.

Note in the picture on page 19 how garbage can be collected and some of it burned to heat a building while metal and glass that does not burn is recovered. Some apartment buildings and hospitals in Sweden handle garbage in this way.

One way to reduce the solid waste problem is *not* to produce so much of it. Do we really need all the cellophane, cardboard, colored paper, metal foil, and plastic bags that so many things come in? Can we get along with less packaging?

Find Out More About Solid Wastes

Do a litter survey of your neighborhood or schoolgrounds—perhaps as a class project. How much of what can you find? Collect the litter (wearing gloves) and place it in paper grocery bags. Skip food waste. Weight or count the number of bags filled. How much litter did you get? Does the amount surprise you?

What kinds and how much of each kind of litter did you collect? Divide the litter on the ground into separate piles as follows:

Paper
Metal Cans
Bottles, Jars, and Glass
Plastic
Wood
Other Scrap Materials

Weight each pile. Which pile weighs the most? Also note which pile takes up the most room. Is the pile that takes up the most room the same pile that weighs the most? If there is a difference, explain the importance of that difference in waste disposal. Is there something you can do to reduce the amount of room needed for any pile of litter?

Which kinds of litter will decay outside exposed to rain and sunlight? Of those kinds, which will decay in a few days? In a few years? In hundreds of years? And which will remain practically forever? What accounts for the differences?

Can all the litter be *recycled* now? Find out what you can about possibilities (a teacher, librarian, or the sanitation department can help you).

What does your community do with the trash and garbage it collects? Is it put in an open garbage dump or a sanitary landfill? Are there any recycling centers or systems to recover metal and glass wastes? Visit disposal sites and see for yourself.

(P.S. REMEMBER TO REMOVE AND PROPERLY DISPOSE OF ALL COLLECTED LITTER.)

Checklist For Action

Here are ten ways to help reduce solid waste problems. Can you list others?

- Check to see if soda machines in school cafeterias use returnable bottles and if they do not, ask the school principal about it.
- Help to organize a school, club, church, or synagogue recycling center.
- Have a contest to see who can pick up the most litter in an area of several blocks or along a stretch of a not-too-busy highway.
- Interview the head of the sanitation department on your community's solid waste management problems for a report to classmates.
- Make an exhibit describing solid waste problems using litter found in your community for display at school or in a library.
- Write a poem about trash and garbage problems for a school assembly program.
- Take a trip to a waste disposal site that serves your community.
- Find out what kind of laws your community has about trash and garbage disposal in your community and how well they are enforced.
- Ask your teacher to invite a sanitation worker to talk to the class about the kinds and amounts of garbage and trash collected in your community.
- Organize a group to clean up a vacant lot and turn it into an outdoor play area (with approval from the lot owner and help from adults.)

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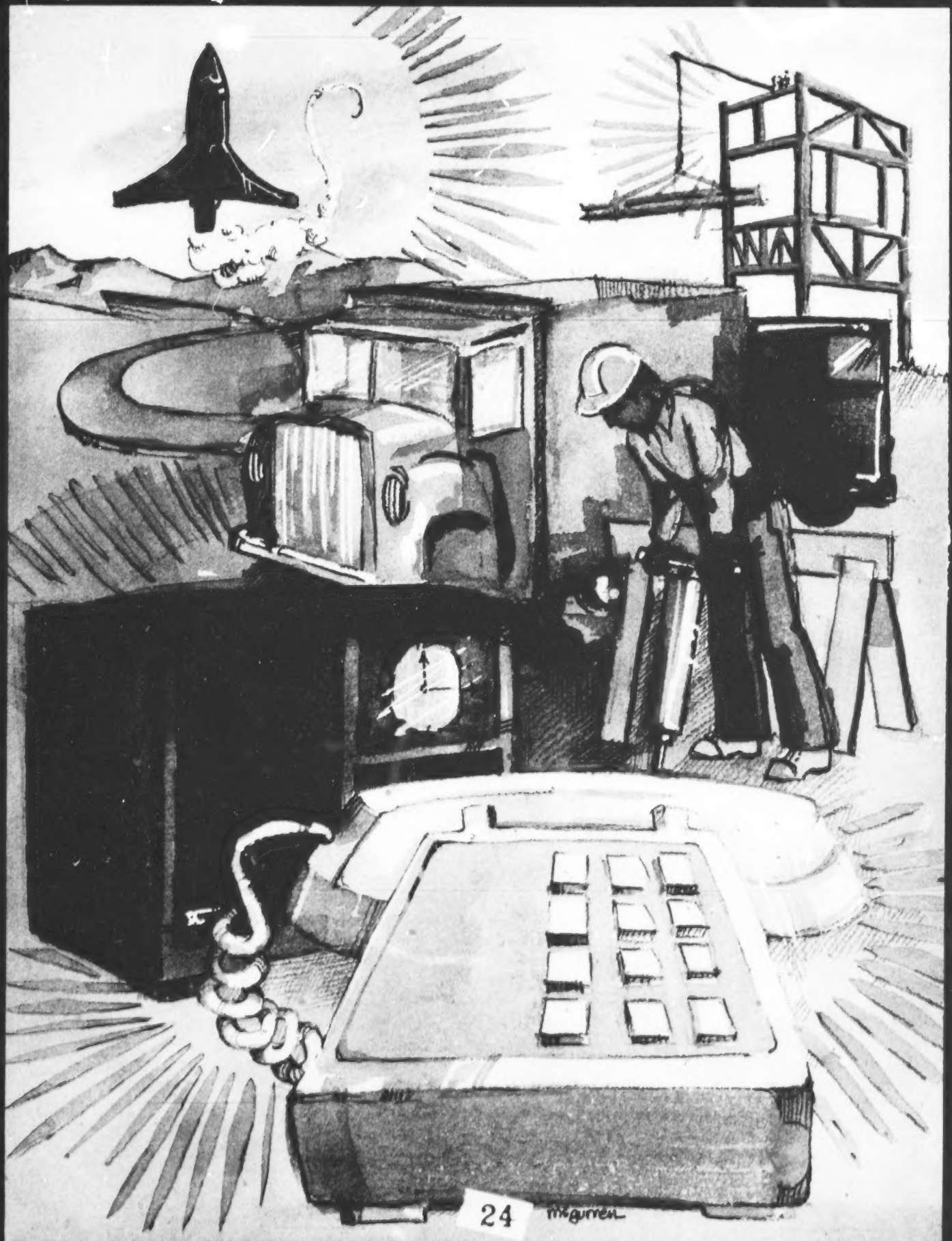
What Would You Do?

You want to buy some recycled writing paper. A store near you has the recycled paper next to regular writing paper. The recycled paper costs one-dollar more than the regular paper. Which do you buy?

A dog owned by a neightbor runs loose and knocks over garbage cans put out for garbage pickup. The garbage is always scattered on the street. What would you do about the problem?

Answers to questions at beginning of chapter:

1. The average American throws away about five pounds of refuse each day.
2. Americans throw away about 4.5 billion tons of solid wastes each year. This includes household, commercial, agricultural, animal, industrial, and mining wastes.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McGurren

Needed: Freedom from Noise Pollution

Try these questions (correct answers at end of chapter):

1. What is the first warning that a sound may be loud enough to hurt your hearing?

2. What are the first sounds lost to ears affected by harmful noise?

What Is Noise

Noise is ear pollution. It is often called "unwanted sound". If a sound is something you like, say a song or a call from a friend then it is just a sound. But if you are trying to sleep or study, a sound like that becomes a *noise*.

Loud noises can affect your hearing. Noise of any kind may make you nervous or affect your sleep. Noise can also affect your speech and your ability to think. And noise (along with other causes) has been linked to cases of heart disease, ulcers, mental illness, and other sicknesses.

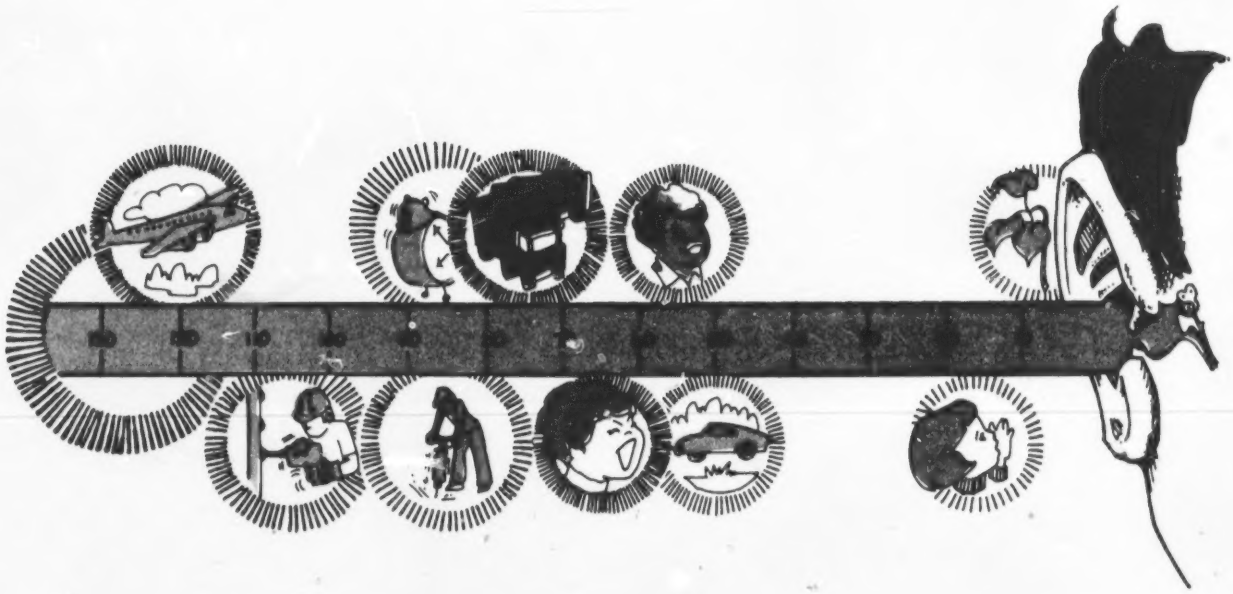
Wanted sound, such as amplified rock-and-roll music, can hurt your hearing, even though you may not think of it as noise.

Noise, of course, is not always bad. You may not like to hear car horns, but they warn you of coming cars when you cross streets. A thumping noise from a bike tire warns you that the tire may be flat. And one can block out another noise, for example when loud music drowns out the sounds of a typewriter in an office.

Sound is made by air pressure on your eardrums. (See the chapter drawing of an ear and its parts.) For example, when you clap your hands, listen to the "clap" sound. Air was pushed out from between your hands when you brought your hands together. At almost the same time, air in your ears pushes your eardrums inward. And your ears signal your brain to give you the "feeling" of a clap sound.

Air your hands pushed did not travel to your ears. But the push travelled from your hands to your ears at a speed of 770 miles per hour, moving through the air much as waves move over the surface of water. This wave of "push" or pressure moving through the air was a sound wave.

The number of sound waves hitting your eardrums each second controls the highness or lowness of the sound you hear. The strength of sound waves is measured by a sound level meter in units



Loudness of Sounds (in decibels)

called *decibels*. Note the "noisiness" of the different sounds in the decibel scale included here. In general, every increase of ten decibels doubles the noisiness of a sound.

How Noise Affects Your Health

Ear pain is felt if sounds are too loud for three tiny bones in ears called *ossicles* to soften them enough. The ossicles change the loudness of sounds before they enter the inner ear. Vibrations from the overly loud sounds that reach the inner ear may rip and tear tissues that are needed for hearing. Damage from the sound vibrations can affect the ability to hear.

Ears will heal themselves if not seriously injured. There may be only a short time after the loud noise that you cannot hear. But hearing can be lost forever if the damage is very bad. Or hearing may be damaged so that you may hear some sounds, but not others. For example, a car horn may be heard, but not someone speaking.

Making The World Quieter

The world is getting noisier. Big machines roar, air conditioners whir, lawn mowers snarl, car horns blast, sirens screech, telephones ring, people yell, dogs bark,—noise is most everywhere.

But the world could be made quieter. It should. Our health depends on it.

Noise can sometimes be softened at its source. For example, mufflers on car exhaust pipes give exhaust gases a chance to spread out a little before the gases are pushed out into the air. Because of this, the gases make weaker sound waves than if they were piped directly from the motor into the air. What other noises can be softened at their source?

Another way to reduce noise is to soak the noise up. When sound waves bounce off walls and ceilings in rooms, their echoes add to the new sounds in the rooms and make a jumble of noise. Ceilings made of acoustical tile (tiles with tiny holes in them) absorb sound waves much as sponges soak up water.

Putting machines on rubber pads can reduce noise by keeping tables and floors from vibrating along with the machines and making noise as they vibrate. What machines in your house can be made quieter by putting them on rubber pads?

Noise can also be blocked or stopped completely! That might seem like the easiest way to stop noise, but it is not always so. For example, to soundproof rooms would require that walls and ceilings be very thick and covered with special soundproofing materials. The extra materials and building requirements would make houses and apartments much more expensive.

Would the soundproofing materials be worth the extra cost? What would your parents decide? What would you decide? What would the decision finally be based on?

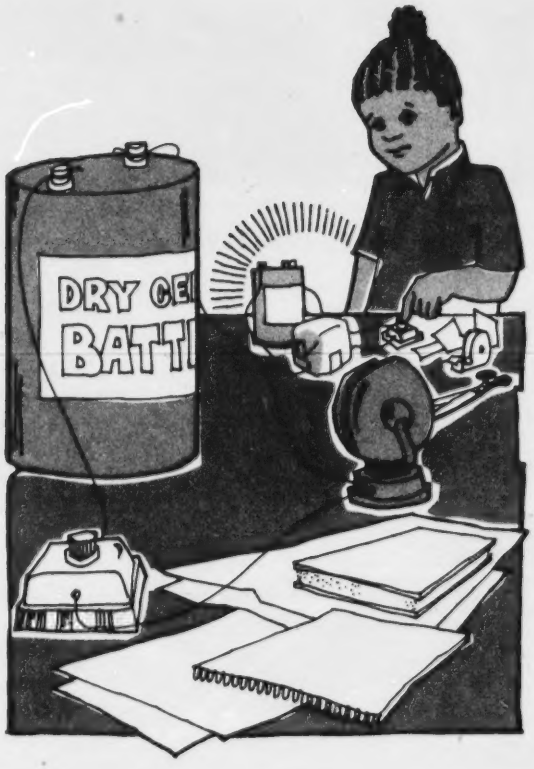
Blocking out all outside sounds from rooms can cause a different noise problem, however. For example, this was done in the reading room of a new library. The room was so quiet that the sound of a reader turning a page or pushing back a chair disturbed other readers. Scientists have found that people work and feel better when they hear some familiar outside noises.

Find Out More About Noise

How noisy is your neighborhood or the area around your school? Your ears may fool you since you are used to hearing certain sounds, but not others. Try making a noise survey using a battery-operated tape recorder, which will not be fooled. Walk around outside with a tape recorder on. Play back the tape you made in a quiet room. Can you tell which was the noisiest place surveyed?

Make a list of all the sounds you hear on the tape. What made them? Could any of the sounds be softened or stopped? Were all the sounds necessary?

List all of the sounds you like to hear on the left side of a sheet of paper. List the sounds you do not like to hear on the right side of that same sheet. Have your friends and classmates make similar lists. Compare lists. Does everybody like or not like



the same things? Can you explain your findings?

Make or buy a buzzer set that includes a battery, buzzer, wire, and switch. Have a contest with friends and classmates to see who can muffle the sound of the buzzer most. Try surrounding the buzzer with cardboard, plastic, and other materials to get the muffling effect. The winner will be the person who muffles the sound most with materials that weigh the least (since weight is important).

Checklist for Action

Here are ten ways to help reduce noise pollution problems. Can you list others?

- See if your school or club can arrange to borrow a sound level meter and record the decibel levels of sounds on streets, in traffic, and at an airport as a group project.
- Make a tape recording of the noisier and quieter places in your community and play it for friends, family, classmates, and others.
- Find out what the noise control laws are in your community and how they are enforced.
- Locate noise pollution sources in your school and develop a plan that you share with your school principal to reduce school noise problems.
- Develop a skit or play that you and others can perform about noise pollution problems.
- Test to see how low you can set the volume control on a television, record player, tape player, and radio and still enjoy listening.
- Wait until you are closer to people before talking to them instead of shouting at a distance.
- Use ear plugs at live "rock" concerts to soften the music and protect your hearing.
- Help plant trees and shrubs to screen your house from street and highway noise.
- Attend a public hearing on noise control laws and offer to give your opinion about noise pollution problems.

What Would You Do?

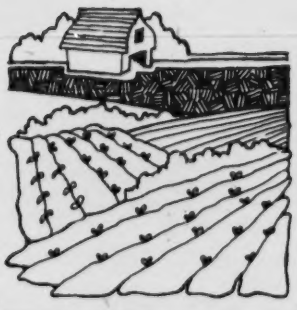
A teenager who lives down the block from you loves his noisy motorcycle. He wants *everyone* to hear him and know he is there when he rides by. The noise of his motorcycle disturbs you and your family. What should you do about it?

You are trying to do your homework in your bedroom. You cannot concentrate on it because your sister is playing music loudly in the next room and your baby brother is watching a noisy cartoon on television. What would you do?

Answers to questions at beginning of chapter:

1. The first warning that a sound may be loud enough to hurt you is ear *distress* (for example, pain or ringing noises).

2. The first sounds lost to ears by harmful noise are usually the **f, s, th, ch** and **sh** sounds. Loss of these sounds is likely to be followed (if you lose more of your hearing) by loss of **b, t, p, k** and **d** sounds. In any event, doctors should examine people with hearing complaints.



Needed: Safer Use of Pesticides

Try these questions (correct answers given at end of chapter):

1. What is the most important thing to do before using a pesticide?

2. How many pesticides are now registered in the United States?

Pesticides Can Help And Harm

Pesticides are chemicals that kill, repel, reduce the harm of, and prevent development of *pests!* Pests include "harmful" insects, mites, fish, rats, mice, fungi, weeds, and other animals and plants. They are harmful because they injure, kill, and spread disease to people and "desirable" animals and plants, and spoil food, clothing, household furnishings, and buildings. How many pests can you name?

Desirable animals and plants are those that people like and make use of or that are important to a healthy environment. These include living things that provide food (such as crop plants and cattle), fiber (such as trees), or are used as decoration (such as houseplants) and pets (cats, dogs, and others). Also included are animals and plants found in nature that people enjoy or are needed for good ecology.

But misused—applied without following proper directions—pesticides can harm people and the animals and plants people want to protect! Pesticides can poison. And the remains of some pesticides last for many years, injuring and killing long after and in places distant from where they were first used.

The message is plain. *Pesticides* are useful. They protect us and desirable animals and plants. But misused, pesticides can harm us and the animals and plants we want to protect. *Danger, warning, caution,*—these are the three most important words to remember when pesticides are used.

Protect Yourself From Pesticides

NEVER USE PESTICIDES YOURSELF!

It is dangerous and it is against the law for children to use pesticides! Pest control with pesticides is a job for adults!

Do learn, however, to recognize a pesticide by the label on a container. But

avoid touching or using pesticide containers in any way—even if they are empty! Spilled pesticides on a container can poison you!

Three kinds of pesticide labels are pictured below. Each has a key word you should look for. These words, already mentioned in this Chapter, are:

DANGER
WARNING
CAUTION

Find these key words on the labels:

SHOULD YOU OR SOMEONE ELSE BE ACCIDENTALLY POISONED BY A PESTICIDE, FOLLOW THE DIRECTIONS ON THE PESTICIDE LABEL FOR WHAT TO DO!

Other Ways To Control Pests

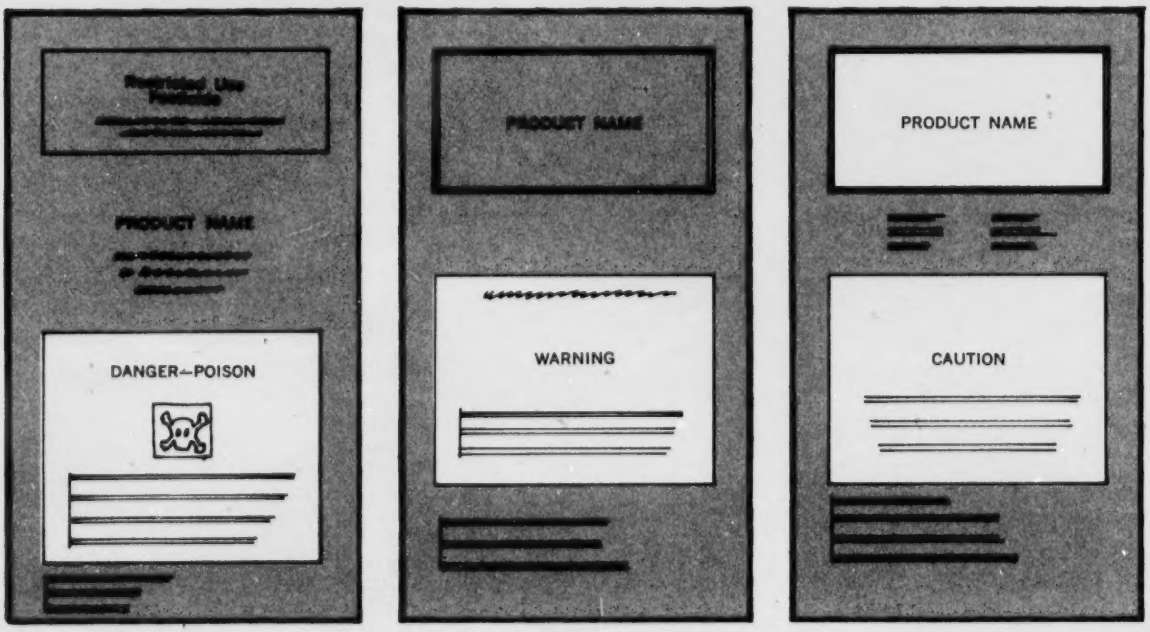
Many pests are no longer affected by pesticides. They were born with the ability to survive attacks by pesticides. This ability came from their parents who had a natural *resistance* to (were not affected by) pesticides used on them in the past. The parents passed that natural resistance on their offspring in the birth process.

Because many pests are now resistant to pesticides and pesticides can be dangerous to non-pests, people seek other ways to control pests. These other ways do not involve use of pesticides. They include:

Control By Predators And Disease. Use of animals that eat and kill pests and diseases of pests. The predators and disease-causing organisms are raised in laboratories and released where the pests are. An example: use of lady beetles to control cottony-cushion scales (insects that affect citrus trees) in California.

Sterilization. Radiation and *chemicals* are used to damage body cells that male pests raised in laboratories need to produce babies in females. The sterilized males are released to mate with females. No babies can be born from that mating, so there are no new pests tc replace adults when they die. An example: the sterilization program that ridded Florida of a major livestock pest, screw-worm flies.

Attractants. Use of sound, light, and sex odors to *attract* pests into traps or confuse



them so that they cannot find their mates! (Attractants are pesticides if they *kill* as well as attract.) An example: using attractants to rid Hawaii of a major fruit pest, oriental fruit flies.

Resistant Crop Varieties. Use of new breeds of plants that naturally resist insect attacks, fungi, and disease. An example: planting naturally resistant breeds of wheat.

Farming Methods Control. Planting and growing crops in such a way that you "outsmart" the pests! This includes planting before pests come or after they go, planting different kinds of crops on the same land in different years so pests of one crop cannot build up in numbers from year to year and planting crops where the pests do not live. An example: growing cotton in the West where boll weevils (cotton-killing insects) do not live.

Most of the ways to control pests without pesticides still need to be developed. But if everyone works together, control of pests without pesticides will be a reality for many pests in the future!

Integrated Pest Control

Integrated pest control is a fancy way of saying that both pesticides and other methods of control should be used to stop pests! The best mix of pesticide and non-pesticide controls will depend on what you have and what works in a certain case. Cases will differ. And the best mix of methods will not only control the pest involved, but will have the least harmful effect on the environment.

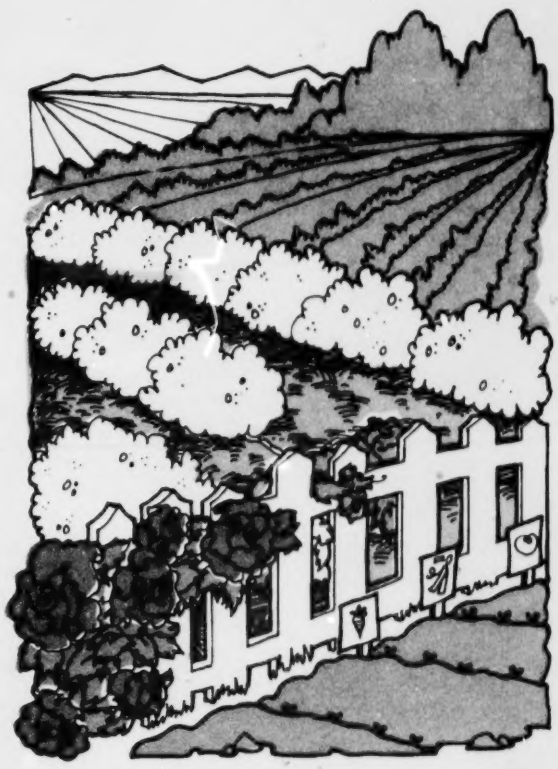
Find Out More About Pesticides

Pick a landscaped area around your school or housing development and find out what kinds and how much pesticide are used to maintain it. Ask the custodian or whoever else is in charge about pesticide use. What chemicals are in the pesticides?

Are there alternatives to the pesticides that could be used? A county agricultural agent, park manager, or science teacher may know. Can you find anything about possibilities in the library, too?

Alternatives to pesticides are not necessarily better to use than pesticides. There are good and bad points to most every method of pest control. What is the case for alternatives to maintain the landscaped area you are investigating?

Write down the good points about each method of pest control on the left side of a sheet of paper. Write down the bad points on the right side of the paper. Take into account the cost of each method (for material and labor), how well each method controls pests and how each method might harm ecology. On the whole, which methods are best? Which methods are worst? Do others agree with your find-



ings? What do pesticide laws say?

Visit the landscaped area during a heavy rain. Where is the water running off the area going to? Could the runoff water contain remains of some pesticides? Would runoff pesticides harm people, animals, or plants elsewhere? How could you find out?

Checklist for Action

Here are ten ways to protect you and others from misuse of and to reduce the need for pesticides. Can you list others?

- *Never* USE PESTICIDES YOURSELF! It is dangerous and it is against the law for children to use pesticides! This is a message that cannot be repeated too often!
- Remind adults that they are required by law to follow directions on pesticide labels for use of the pesticides described and for proper disposal of empty pesticide containers.
- *Adopt* a street tree to take care of. Keep it weeded to remove hiding places for pests. And water it in dry weather to keep it strong and resistant to pests.
- Wearing gloves, pick off larger pests on plants with your hands. These pests include caterpillars, grasshoppers, and some but not all beetles.
- Spray water from a hose on plants in the early morning to wash away plant pests. Spraying early allows the sun enough time to dry the leaves. It also insures that more water will stay in the ground for use by plants than it would later in the day because of evaporation.
- Protect lady beetles, praying mantises, spiders, toads, and birds around your house so that they can help in the control of insect pests.
- Help plant trees and shrubs around your house that are naturally resistant to pests. This includes many plants that grow wild in your area.
- Help to plan a special program at school on protecting yourself and others from misuse of pesticides. (Ask your local health department for aid.)
- Find out what your community is doing to protect people from misuse of pesticides.
- Pass out leaflets available from your health department or EPA on safe use of pesticides to friends and neighbors.

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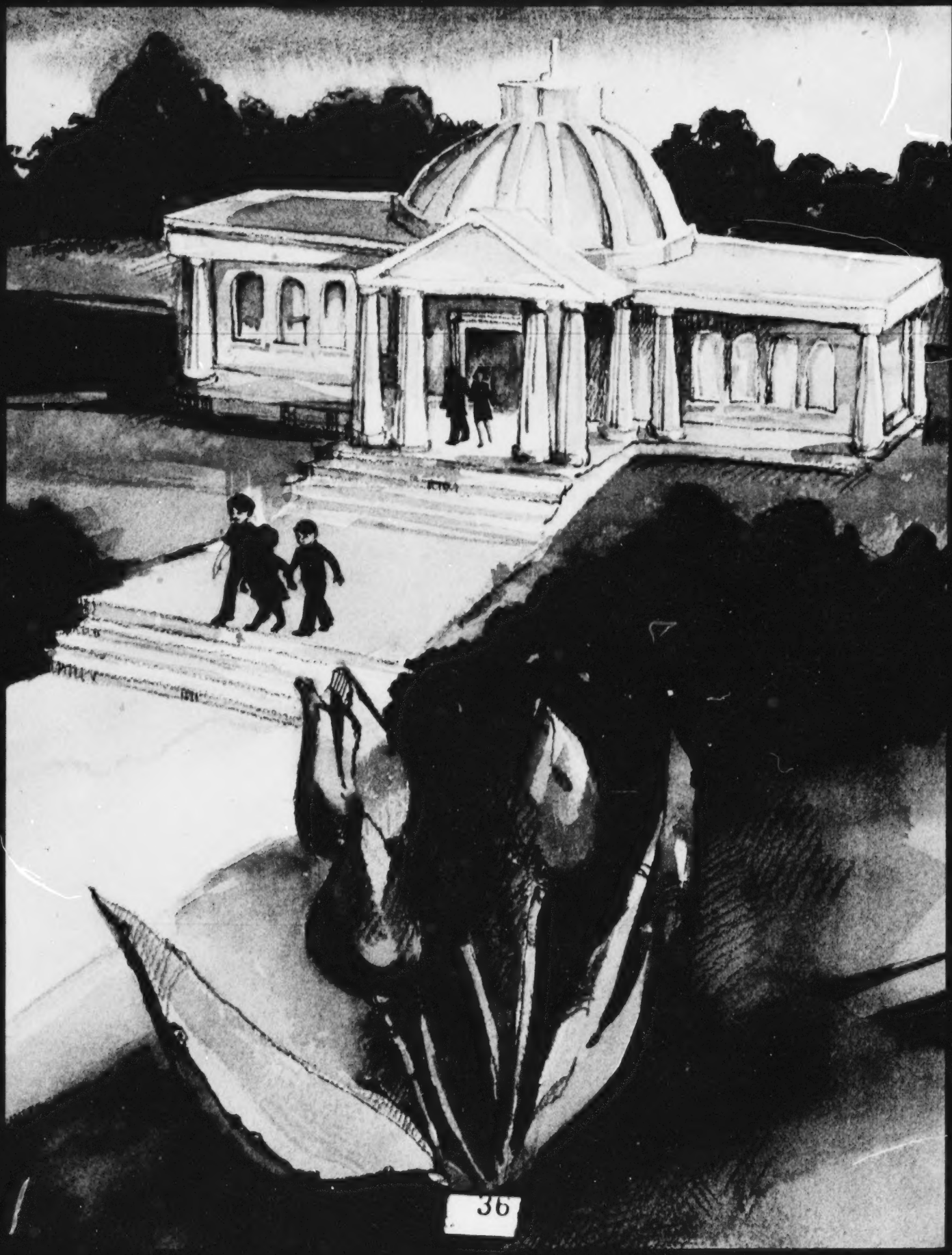
What Would You Do?

A neighbor is spraying some shrubs with a pesticide on a windy day. Some of the pesticide is blowing your way—you can smell it! What should you do?

When your neighbor finishes spraying his shrubs with a pesticide, he tosses the empty pesticide container into an open garbage pail in front of his house. You worry because you have learned that the container may be dangerous to people who handle it as the garbage pickup people may do. Of course, you know better than to touch the container yourself! What would you do?

Answers to questions at beginning of chapter:

1. The most important thing to do before using a pesticide is to *READ THE LABEL* and *FOLLOW DIRECTIONS.*
2. Over 34,000 pesticides made from one or more of about 900 chemical compounds are now registered in the United States. (See Appendix I, under the category of "Pesticides" for more information on what registration involves.)



Appendix I
The U.S. Environmental Protection Agency and Environmental Laws

The U.S. Environmental Protection Agency or "EPA" was created in 1970. Its job is to work with other Federal agencies, State and local governments, business firms and citizens on environmental problems of air and water pollution, solid waste, pesticides, radiation, and noise. EPA acts under laws of Congress.

EPA's main mission is to set and enforce ENVIRONMENTAL STANDARDS. These standards are limits on how much pollution can be allowed without harm to the health and welfare of people. Standards change as EPA learns more and more about pollution. People and companies that do not obey environmental standards may be fined and jailed by the courts.

The following is a summary of environmental laws that EPA operates under in the areas of air, water, solid waste, noise, and pesticides:

Air

Highlights of the Clean Air Amendments of 1970

- EPA is required to set *standards* for all air pollutants. EPA is also required to set *limits* on air pollutants produced by community incinerators, power plants, and industrial plants; limits on air pollutants from automobiles and; limits on very dangerous air pollutants such as beryllium, mercury, asbestos, and vinyl chloride.

Each State adopts a plan to achieve EPA clean air standards or, if a State fails to do so, EPA will given them a plan.

- EPA will research all aspects of air pollution and its effects on health.
- Citizens can take legal action against violators of clean air standards.

Water

Highlights of the Federal Water Pollution Control Act Amendments of 1972

- Pollutants cannot be put into navigable waterways (includes most waterways in the United States) without a permit. EPA or a State with a pollution control program and EPA approval, can give such permits.
- No radioactive wastes can be dumped into waterways.
- EPA can give money to communities to build wastewater treatment plants; give money to States for waste treatment plans for large areas and; loan money to small

business to help them to meet clean water standards.

- EPA is required to research all aspects of water pollution and its effects on people's health.
- Citizens have the right to take legal action against water polluters. And citizens can help make rules for water pollution control.

Highlights of the Safe Drinking Water Act of 1974

- EPA can set standards for drinking water to ensure that it is safe to use.
- Each State can enforce drinking water standards or EPA will do the enforcement for a State that cannot.
- EPA can research all health aspects of drinking water and help the States to improve their drinking water.
- An advisory council of 15 persons (representing State, local, and private organizations) will advise EPA on safe drinking water policy.
- Citizens can take legal action against any public water system or Federal agency (including EPA) that fails to follow safe drinking water rules.

Solid Wastes

Highlights of the Solid Waste Disposal Act of 1965 (As amended by the Resource Recovery Act of 1970)

- EPA gives money for building and operating plants and processes that show how to dispose of and recover valuable materials from solid waste. EPA also gives money to State and local governments for planning overall programs of solid waste disposal and recovery. And EPA helps to train people to build and run large and complex systems of waste disposal and recovery.
- EPA is required to research all aspects of solid waste management, its effects on health and techniques for disposal and recovery.
- EPA is required to develop a plan for a system of national sites where very dangerous wastes can be stored and disposed of.
- EPA gives advice on waste disposal and recovery and *requires* Federal government-operated facilities to follow disposal and recovery guidelines.

Noise

Highlights of the Noise Control Act of 1972

- The EPA Administrator is required to protect the health and welfare of people by setting standards for noise from building equipment, transportation equipment (except aircraft), all motors and engines, and electric equipment.
- EPA *advises* the Federal Aviation Administration or "FAA" on standards for aircraft noise. But FAA makes and enforces rules for aviation noise.
- EPA can require that products be labelled to show how noisy they are.

Highlights of the Resource Conservation and Recovery Act of 1976

- Requires that handling and disposal of hazardous waste, produced mainly by industry, will come under Federal/State regulation. The law also requires that all open dumping of solid waste be ended throughout the country by 1983.
- EPA will identify and publish a list of hazardous wastes, and set standards for the handling, transportation, and ultimate disposal of these wastes. States are to establish regulatory programs under guidelines given by EPA, or EPA will do it for them.
- Civil and criminal penalties for noncompliance are up to $25,000 per day, a year in prison, or both.
- EPA will establish criteria for identifying both open dumps and sanitary landfills, and provide aid to help rural communities meet the new requirements.
- Citizens can bring suit to obtain compliance with the law.

Highlights of the Toxic Substances Act of 1976

- Requires pre-market testing for human and environmental health of new chemical substances; EPA can prevent or limit the use of substances found to be harmful.
- Bans the manufacture of PCB's (polychlorinated biphenyls), phased-out over a two-year period, to take effect in 1979. PCB's have been used in many commercial products, such as printing inks, electrical equipment, and bendable plastics.
- Citizens can bring suit to obtain compliance with the law.

Pesticides

Highlights of the Federal Insecticide, Fungicide and Rodenticide Act of 1947 (as amended in 1972 and 1975)

- People and firms that make pesticides must register them with EPA before they can be sold in the United States.
- Pesticide makers must give proof that the products they make affect pests in the way the makers say they do and will not harm people, livestock, wildlife, and crops when used as directed.
- EPA can decide whether a pesticide can be used in general or used only in *special* ways. Pesticides allowed for general use are not likely to hurt the user when directions are followed. Pesticides allowed only for special use are very dangerous if misused and can only be applied by people *certified* (trained and licensed) to do so.
- EPA is required to set standards for certifying appliers of pesticides allowed only for special use. Each State, however, does the actual certification based on EPA standards.
- The EPA Administrator can cancel or stop registration of pesticides found or suspected of being harmful to people, livestock, wildlife, and crops.
- EPA *action* on pesticides is reviewed by the U.S. Department of Agriculture and a Scientific Advisory Panel.
- The EPA Administrator can give a "stop sale, use, and removal" order when a pesticide already in use is found to be in violation of the law.
- All pesticide containers must be labelled according to ways developed by EPA (see labels in Chapter 5) and; all pesticide container storage and disposal methods are developed by EPA.

Appendix II
Regional Offices of EPA

EPA Regional Offices	States Covered
EPA Region 1 Room 2303 JKF Federal Building Boston, MA 02203	Connecticut, Maine Massachusetts, New Hampshire, Rhode Island, Vermont
EPA Region 2 Room 1005 26 Federal Plaza New York, NY 10007	New Jersey, New York, Puerto Rico, Virgin Islands
EPA Region 3 Curtis Building 6th and Walnut Streets Philadelphia, PA 19106	Delaware, Maryland Pennsylvania, Virginia, West Virginia, District of Columbia
EPA Region 4 345 Courtland St., NE Atlanta, GA 30308	Alabama, Georgia, Florida, Mississippi, North Carolina, South Carolina, Tennessee, Kentucky
EPA Region 5 230 South Dearborn Street Chicago, IL 60604	Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota
EPA Region 6 1201 Elm St. Dallas, TX 75270	Arkansas, Louisiana, Oklahoma, Texas, New Mexico
EPA Region 7 1735 Baltimore Street Kansas City, MO 64108	Iowa, Kansas, Missouri, Nebraska
EPA Region 8 Suite 900 1860 Lincoln Street Denver, CO 80203	Colorado, Utah, Wyoming, Montana, North Dakota, South Dakota
EPA Region 9 215 Fremont Street San Francisco, CA 94105	Arizona, California, Nevada, Hawaii
EPA Region 10 1200 Sixth Avenue Seattle, WA 98101	Alaska, Idaho, Oregon, Washington

Appendix III
Books and Films About Pollution

Books

Clear Air—Sparkling Water: The Fight Against Pollution. By Dorothy Shuttlesworth. New York: Doubleday, 19.

Going To Waste: Where Will All The Garbage Go? By James Marshall. New York: Howard McCann, 1972.

Save The Earth! An Ecology Handbook For Kids. By Betty Miles. New York: Knopf, 1974.

The Complete Ecology Fact Book. Edited by Philip Nobile and John Deedy. New York: Doubleday/Anchor, 1972.

The Only Earth We Have. By Lawrence Pringle. New York: Macmillan, 1969.

Understanding Ecology. By Elizabeth T. Billington. New York: Warne, 1968.

Films

Runaround. Free Loan. 17½ minutes. Color. Sponsor: National Lung and Respiratory Disease Association, 1969. About action on air pollution.

The Gifts. Free Loan. 28 minutes. Color. Sponsor: U.S. Environmental Protection Agency, 1973. Wat[illegible], air and land pollution.

The Great All-American Trash Can. Free Loan. 13 minutes. Color. Sponsor: Glass Container Corporation, 1971. About solid waste and recycling.

To Conserve and Protect. Free Loan. 15 minutes. Color. Sponsor: Electronics Corporation, 1970. About noise pollution and protection.

Film Distributors

National Tuberculosis &
Respiratory Disease Association
1740 Broadway
New York, New York 10019

Modern Talking Picture Service
2323 New Hyde Park Road
New Hyde Park, New York 11040

Commonwealth Film Distributors
1440 S. State College Boulevard
Bldg. 6-K
Anaheim, California 92806

Glossary

Air Pollution— Air made dirty and unhealthy by dirt, ash, soot, and chemicals.

Attractants—In pest control: Use of sound, light, and sex odors to attract pests into traps or confuse them so they cannot find their mates.

Biodegradable—Something is biodegradable when it can be broken down quickly into a gas or liquid by microscopic plants and animals.

Biological Control—In pest control: Use of animals and diseases that eat and kill pests to control pests.

Closed System— A system such as a spaceship or Earth in which energy, but not matter, can be exchanged with surrounding space.

Compost—A mixture of garbage and degradable trash with soil in a pile. Bacteria in the soil break down the garbage and trash into fertilizer that enriches the mixture.

Conservation—Avoiding waste of, and renewing when possible, the human and natural resources of the world.

DDT—A pesticide meant to kill only pests but that was found to persist in nature and poison animals that were not pests. Even the health of people might be affected by it. EPA banned its use in the United States in 1972.

Decibel—A unit of sound measurement. In general, a sound doubles in loudness for every increase of 10 decibels.

Ecology—The relationship between living things and their surroundings (environment).

Environment—Everything, including living things, that surrounds a person, animal, or plant.

Estuary—The water along the coast where rivers meet the ocean. Most forms of marine life are born there.

Fertilizer—Materials such as nitrogen and phosphorus that provide nutrients for plants and increase their growth.

Hazardous Waste— Chemical, radioactive, biological, flammable, and explosive waste that need special care in disposal.

Hormones—Chemicals found in plants and animals that affect growth and development.

Incinerator—A furnace for trash and garbage that allows these solid wastes to be burned under controlled conditions.

Integrated Pest Control— A mix of pesticide and non-pesticide methods to control pests.

Noise—Unwanted sound. It can do harm both when low or loud.

Organic Compounds—Animal- or plant-produced chemical compounds with a basic carbon structure.

Ossicles—Three tiny interconnected bones (tiniest in the body) of the middle ear. Called the "hammer," "anvil," and "stirrup." Ossicles change the loudness of sounds before they enter the inner ear. Loud sounds are softened; soft sounds are made louder.

Pesticide—Chemical that kills pests.

Pollution—Whatever makes land, water and air dirty and unhealthy.

Primary Treatment— In wastewater treatment: the first stage of treatment where all solids that sink or float are removed.

Recycle—Cleaning and renewing things already used.

Resistance—For plants and animals: the ability to withstand attacks by chemicals and disease and poor environmental conditions. This ability may be inborn or developed at a later time.

Resource—A person, thing, or action needed for living or to make life better.

Sanitary Landfill— site where garbage and trash are taken and covered daily with a layer of soil. A sanitary landfill keeps pests away, holds litter in place, reduces runoff of wastes during rain, stops smells, and prevents fires.

Secondary Treatment— In wastewater treatment: the second stage of treatment where sewage is mixed with air and sludge to increase the growth of bacteria that "eat" the organic pollutants.

Sediments—Soil, sand, and minerals washed from land into water usually after rain. Sediments pile up in reservoirs, rivers, and harbors, destroying fish nesting areas and homes of water animals, and clouding the water so that needed sunlight might not reach water plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to be washed off the land after rainfalls.

Sludge—Material found in wastewater treatment plants that is made up of tiny particles of solid wastes loaded with pollution-eating bacteria.

Smog—Eye-stinging haze that hangs over most cities and is produced when chemicals in the air mix with sunlight.

Solid Waste— All trash and garbage. When not reused, might better be called, wasted solids!

Sound Waves— Pressure moving through the air like waves moving on the surface of the ocean, produced by a sound.

Standards—Limits on how much pollution can be allowed without harm to the health and welfare of people.

Sterilization—In pest control: Use of radiation and chemicals to damage body cells needed to produce babies.

Tertiary—In wastewater treatment: a third stage of treatment to remove pollutants missed by primary and secondary treatment. Uses electrical, chemical, carbon filter, and other cleaning techniques and is the most expensive treatment.

Water Pollution—Water made unsafe to use because of sewage and other wastes that have been dumped untreated into it.